Patent claims

1.   Method for matching the data rate of a data stream in a
     communications device,
     - where the data stream can be subdivided into at least one data
     block containing transmission bits to be transmitted
     - where the transmission bits are formed from a coding process
     from input bits bearing information,
     - in which, to match the data rate, specific transmission bits
     are removed (punctured) from a data block of the data stream,
     - where the transmission bits which are to be removed are
     specified by a puncturing pattern,
     - and the puncturing pattern is designed such that transmission
     bits are preferably removed which are dependent via the coding
     process on few input bits.

     the puncturing pattern is made up of the following steps:
     - Determining a cumulative puncturing strength which specifies
     which component of the information bits was removed from the data
     block by removal of transmission bits,
     - Formation of a decision function depending on the cumulative
     puncturing strength,
     - Minimization of the decision function to determine the
     puncturing pattern.

2.   Method for matching the data rate of a data stream in a
     communications device,
     - where the data stream can be subdivided into at least one data
     block containing transmission bits to be transmitted
     - where the transmission bits are formed from a coding process
     from input bits bearing information,
     - in which, to match the data rate, specific transmission bits
     are removed (punctured) from a data block of the data stream,

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- where the transmission bits which are to be removed are
specified by a puncturing pattern,

- and the puncturing pattern is designed such that transmission
5   bits are preferably removed which are dependent via the coding
process on few input bits and the puncturing pattern is embodied
in such a way that, by puncturing, viewed from the front end of
the data block to be punctured, a section consists of a section
of the following sequence (bit positions): 1, 4, 2, 3, 8, 7, 5,
10   6, 15, 12, 14, 11, 10, 9, where "1 it" corresponds to the first
bit position.

3.   Method for matching the data rate of a data stream in a
communications device,

- where the data stream can be subdivided into at least one data
15   block containing transmission bits to be transmitted

- where the transmission bits are formed from a coding process
from input bits bearing information,

- in which, to match the data rate, specific transmission bits
are removed (punctured) from a data block of the data stream,

20   - where the transmission bits which are to be removed are
specified by a puncturing pattern,

- and the puncturing pattern is designed such that transmission
bits are preferably removed which are dependent via the coding
process on few input bits and the puncturing pattern is embodied
25   in such a way that, by puncturing, viewed from the back end of
the data block to be punctured, a section consists of a section
of the following sequence (bit positions): 0, 4, 6, 1, 2, 15,
12, 14, 10, 9, 7, 4, 5, 18, 13, 8, where "0" corresponds to the
last bit position.

30   4.   Method in accordance with one of the preceding claims in which
the puncturing pattern uses a puncturing rate to specify the gap

between the transmission bits to be removed, in which case the
puncturing rate differs for different areas in the data block.

5. Method in accordance with Claim 3 in which the puncturing rate
in the middle area of the data block features essentially
equidistant gaps between the bits to be removed.

6. Method in accordance with one of the previous claims,
characterized in that
The puncturing pattern is embodied in such a way that 8 of 48
bits are punctured and these are the bits 1, 2, 4, 8, 42, 45,
47, 48.

7. Method in accordance with one of the previous claims,
characterized in that
The puncturing pattern is embodied in such a way that 31 of 111
bits are punctured and these are the bits 1, 2, 3, 4, 5, 6, 7,
8, 12, 14, 15, 24, 42, 48, 54, 57, 60, 66, 69, 96, 99, 101, 102,
104, 107, 108, 109, 110, 111.

8. Method in accordance with one of the previous claims,
characterized in that
The puncturing pattern is embodied in such a way that 14 of 54
bits are punctured and these are bits 1, 2, 3, 4, 7, 8, 36, 39,
42, 48, 51, 52, 53, 54.

9. Method in accordance with one of the previous claims 1 through 8
characterized in that
The puncturing pattern is embodied in such a way that 14 of 54
bits are punctured and these are bits 1, 2, 3, 4, 7, 8, 39, 45,
48, 51, 52, 53, 54.

10. Method for matching the data rate of a data stream in a
communications device

- where the data stream can be subdivided into at least one data
block containing transmission bits to be transmitted
- where the transmission bits are formed from a coding process
from input bits bearing information,
- in which, to match the data rate from a data block of the data
stream, specific transmission bits are repeated,
- where the transmission bits to be repeated are specified by a
repetition pattern,
- and the repetition pattern is designed such that transmission
bits are preferably repeated which are dependent for the coding
process on many input bits and or which the repetition pattern
is made up of the following steps:
- Determining a function of a cumulative repetition strength
which specifies,
- which component of the input bits was repeated by repeating
transmission bits in the data block,
- Formation of a decision function depending on the cumulative
repetition strength,
- Maximization of the decision function to determine the
repetition pattern

11. Method according to Claim 10
characterized in that
The repetition rate of the repetition pattern which specifies
the gap between the bits to be repeated essentially requires
equidistant gaps in the middle area of the data block and at the
edge of the data block requires gaps that are large enough for
no bit to be repeated

12. Method according to one of the previous Claims 10 to 11
characterized in that

the repetition pattern is designed in such a way that 4 of 36
bits are repeated and these are the bits 16, 18, 20, 22.

13. Method according to one of the previous claims
   5   characterized in that
      The data block in which the rate matching is performed comprises
      data coded with a convolution code.

14. Communications device
      with a rate matching device (6) for puncturing or repetition of
  10   a data block of a data stream directed to the rate matching
      device (6) in accordance with a specific rate matching pattern
      for matching the data rate of the data stream, where the rate
      matching device uses puncturing or repetition of the rate
      matching pattern to remove or repeat corresponding bits in the
  15   data block.
      characterized in that,
      the rate matching device (6) is embodied such that it performs
      rate matching with a puncturing pattern or repetition pattern
      which is embodied in accordance with one of the previous claims
  20   1-13.

15. Communications device according to Claim 16
      characterized in that,
      the communications device (1) is a mobile radio transmitting or
      receiving device, especially a UMTS mobile radio transmitter or
  25   UMTS mobile radio receiver.

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